

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

In re the Application

Applicant(s) : BOERNER *et al.*
Application No. : 10/579,413
Filed : February 20, 2007
Title : LIGHT-EMITTING DEVICE WITH AN IRIIDIUM COMPLEX

APPEAL BRIEF

On Appeal from Group Art Unit 1786

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Date: January 29, 2011

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I. REAL PARTY IN INTEREST

Koninklijke Philips Electronics N.V. is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

As filed, this case included claims 1-10. Claims 1-10 remain pending, stand rejected, and form the basis of this appeal.

IV. STATUS OF AMENDMENTS

This appeal is in response to an Office Action, dated January 6, 2010 and a Final Office Action, dated August 4, 2010. Claims 1-6 and 8-10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP 2003-007467A (hereinafter 'Tsuge') in view of U.S. Application Publication No. 2004/0076853 (hereinafter 'Jarikov'); and claim 7 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuge et al. in view of Jarikov and Furugori et al (US 2003/0141809 A1). On October 30, 2010, an amendment in response to the Final Office Action dated August 4, 2010, was entered by the Examiner, but did not place the application in a form for allowance. A Notice of Appeal was filed on November 20, 2010.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention, particularly, independent claim 1 discloses a light-emitting device, comprising at least a substrate, an anode, a light-emitting layer and a cathode, see page 3, lines 1-3 & Fig. 1; wherein the light-emitting layer includes an iridium complex IrL_3 and wherein at least two ligands L are a dibenzoquinoline, see page 3, lines 26-31.

Independent claim 8 discloses an iridium complex IrL_3 in which at least two ligands L are dibenzoquinolines, see page 3, lines 26-31.

Claims 2-7 untimely depend from independent claim 1 and recite further aspects of the invention claimed.

Claims 9-10 untimely depend from independent claim 8 and recite further aspects of the invention claimed.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issue in the present matter is whether:

- (1) Rejection of: Claims 1-6 and 8-10 under 35 U.S.C. §103(a) as being unpatentable over JP 2003-007467 A (hereinafter 'Tsuge') in view of U.S. Application Publication No. 2004/0076853 (hereinafter 'Jarikov'), and claim 7

under 35 U.S.C. 103(a) as being unpatentable over Tsuge et al. in view of Jarikov and Furugori et al (US 2003/0141809 A1) is in error.

VII. ARGUMENT

Rejections under 35 U.S.C. § 103(a)

Appellants respectfully submit that the rejection of claims 1-6 and 8-10 under 35 U.S.C. §103(a) as being unpatentable over JP2003-007467A (hereinafter 'Tsuge') in view of U.S. Application Publication No. 2004/0076853 (hereinafter 'Jarikov') and claim 7 under 35 U.S.C. 103(a) as being unpatentable over Tsuge et al. in view of Jarikov and Furugori et al (US 2003/0141809 A1) is in error.

It is respectfully submitted that in order to establish a *prima facie* case of obviousness, three basic criteria must be met;

1. there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine the reference teachings;
2. there must be a reasonable expectation of success; and
3. the prior art reference must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success

must be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)

In *KSR Int'l. Co. v. Teleflex, Inc.*, the Supreme Court noted that the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and that it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed:

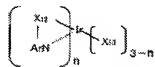
"Often, it will be necessary ... to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an **apparent reason** to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis **should be made explicit**." *KSR*, 82 USPQ2d 1385 at 1396 (emphasis added).

Further, MPEP 2143 states:

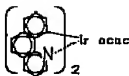
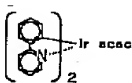
"If the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification."

Claim 1 recites: a “light-emitting device, comprising at least a substrate (1), an anode (2), a light-emitting layer (4) and a cathode (6), wherein the light-emitting layer (4) includes an iridium complex IrL₃ and wherein at least two ligands L are a dibenzoquinoline.” Independent claim 8 recites similar limitations.

In support of the rejection, the Final Office Action has cited one of the claims of Tsuge, which states that a dopant in a luminous layer can be composed of a compound having the following general formula:



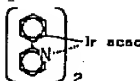
However, as the Office has recognized, “[t]he fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious.” *In re Baird*, 16 F.3d 380, 382 (Fed. Cir. 1994). See also MPEP §2144.08(II). To provide the further basis required to establish the asserted *prima facie* obviousness of claim 1, the Office Action notes that the claimed dibenzoquinoline compounds and the benzoquinoline compounds disclosed in Tsuge are homologs and that Tsuge discloses the possibility of producing fused homologs in formulas 48 and 50, reproduced herein below, respectively:



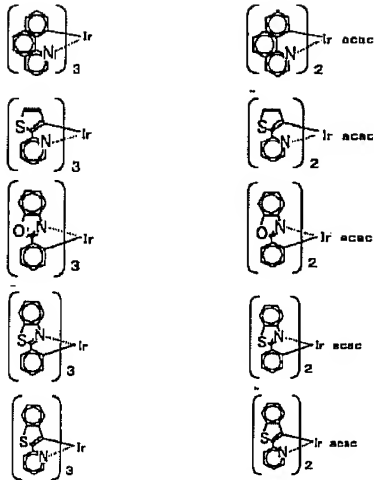
While the Final Office Action has presented a clever argument when viewed in isolation, it should be noted that “when ‘all of the disclosures in a reference’ are considered, the overall suggestion to emerge from the prior art reference may be contrary to that which might appear from an isolated portion of the reference.” *In re Langer*, 465 F.2d 896, 899 (CCPA 1972). Moreover, “homology should not be automatically equated with prima facie obviousness,” as the prior art as a whole must be compared with the claimed subject matter as a whole. *Id.* at 898-899.

It is respectfully submitted that when the cited reference is viewed as a whole, the overall suggestion of the reference runs contrary to the use of dibenzoquinoline as ligands of an iridium complex. For example, it should first be noted that Tsuge, as discussed in the Amendment submitted on May 5, 2010, is primarily directed to addressing uneven distribution of a host agent toward the cathode side of a device during operation (Tsuge, para. 7). In particular, Tsuge provides only a very short description of doping agents that can be used in an electroluminescent device.

Where Tsuge does describe doping agents, Tsuge mentions the following general formulas of the doping agents that can be used:



and briefly provides the following respective variations of such formulas:



(Tsuge, column 12, line 12, to column 13, line 40).

Each of the variations provided by Tsuge reveals a consistent pattern of dopants in which, at most, only one ring is added to the base 2-phenyl-pyridine. Thus, in view of the teachings of Tsuge as a whole, one of ordinary skill in the art would at best search for variations of the base 2-phenyl-pyridine that have only one additional aromatic ring. Tsuge does not in any way suggest adding more than one ring to the base 2-phenyl-pyridine to synthesize an iridium complex with dibenzoquinoline ligands, as claimed.

Accordingly, it is respectfully submitted that it would not be obvious in view of Tsuge as a whole to employ dibenzoquinoline ligands in an iridium complex for several reasons. First, Tsuge is primarily directed to problems associated with a host agent and provides only a minimal description with regard to iridium complexes used in a dopant. Thus, any reference to Tsuge for teachings on iridium complexes by one of ordinary skill in the art is relatively unlikely. Second, Tsuge teaches the use of iridium complex dopants in which only one ring is added to the base 2-phenyl-pyridine, whereas the claimed complex employs dibenzoquinoline ligands with at least four rings. Third, Tsuge's brief description of iridium complexes does not in any way suggest any reason for diverting from the disclosed pattern of dopants to add more than one ring to the base 2-phenyl-pyridine. As such, it is respectfully submitted that it would not be obvious to modify the iridium complex dopant of Tsuge to produce an iridium complex with dibenzoquinoline ligands, as recited in claim 1.

Furthermore, with regard to the mention of Jarikov in the Office Action, the Examiner has recognized, in view of the Applicant's arguments, that a host serves an entirely different function than dopants of a luminous layer of an organic electroluminescent device (see, e.g., Final Office Action, p. 5, para. 2). Specifically, the doping agent functions as a phosphorescence emitter while the host agent acts as an exciton that excites the doping agent, thereby inducing phosphorescent emission (see Tsuge, paras. 6 and 17). Thus, despite Jarikov's disclosure of utilizing dibenzoquinolines as a host material in organic EL devices, it is respectfully submitted that Jarikov provides no teaching or suggestion whatsoever for employing dibenzoquinolines in a dopant. Indeed, if Jarikov should be combined with Tsuge, Jarikov's description of employing

dibenzoquinoline as a host would at best teach away from using dibenzoquinoline in the dopant of Tsuge. As such, it would not be obvious to use dibenzoquinolines in the iridium complex dopant described in Tsuge in view of Jarikov.

Therefore, the Applicant respectfully requests the withdrawal of the rejection of claim 1 for at least the reasons discussed above.

With regard to claim 8, claim 8 also recites an iridium complex IrL_3 in which at least two ligands L are dibenzoquinolines. As discussed above, neither reference, taken singly or in combination, discloses the use of such an iridium complex nor is it obvious to devise such an iridium complex in view of the references. As such, the cited references do not render claim 8 unpatentable. Thus, withdrawal of the rejection and allowance of the claims is respectfully requested.

With regard to the dependent claims 2-7 and 9-10 these claims ultimately depend from one of the independent claims, which have been shown to be allowable in view of the cited references. Accordingly, claims 2-7 and 9-10 are also allowable by virtue of their dependence from an allowable base claim.

VIII. CONCLUSION

In view of the above analysis, it is respectfully submitted that the referred to reference fails to anticipate the subject matter of any of the present claims. Therefore, reversal of all outstanding grounds of rejection is respectfully solicited.

Respectfully submitted,
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IX. CLAIMS APPENDIX

1. A light-emitting device, comprising at least a substrate (1), an anode (2), a light-emitting layer (4) and a cathode (6), wherein the light-emitting layer (4) includes an iridium complex IrL_3 and wherein at least two ligands L are a dibenzoquinoline.
2. A light-emitting device as claimed in claim 1, characterized in that two ligands L are a dibenzoquinoline, and a third ligand L is selected from the following group: pentane-2,4-dionate (acac), 2,2,6,6-tetramethyl-3,5-heptane dionate (thd), 7,7-dimethyl-1,1,1,2,2,3,3-heptafluorine-4,6-octane dionate (fod), 1,1,1,5,5,5-hexafluoropentane-2,4-dionate (hfa), 4,4,4-trifluoro 1-(2-thienyl)butane-1,3-dionate (tfa), 1,3-diphenyl propane-1,3-dionate (dbm), 4,4,4-trifluorine-1-(2-naphthyl)butane-1,3-dionate (tfnb) and 4,4,4-trifluoro-1-(1-naphthyl)butane-1,3-dionate.
3. A light-emitting device as claimed in claim 1, characterized in that all the ligands L are dibenzoquinolines.
4. A light-emitting device as claimed in claim 1, characterized in that the dibenzoquinoline is dibenzo[f,h]quinoline.
5. A light-emitting device as claimed in claim 2, characterized in that two of the ligands L are dibenzo[f,h]quinoline, and one of the ligands L is pentane-2,4-dionate (acac).

6. A light-emitting device as claimed in claim 1, characterized in that the light-emitting layer (4) includes a further light-emitting material.
7. A light-emitting device as claimed in claim 6, characterized in that the further light-emitting material is a further iridium complex.
8. An iridium complex IrL_3 in which at least two ligands L are dibenzoquinolines.
9. The iridium complex of claim 8, wherein the iridium complex is $\text{Ir}(\text{dibenzo}[\text{f},\text{h}]\text{quinoline})_2(\text{pentane-2,4-dionate})$.
10. The iridium complex of claim 8, wherein the iridium complex is $\text{Ir}(\text{dibenzo}[\text{f},\text{h}]\text{quinoline})_3$.

X. EVIDENCE APPENDIX

No evidence has been submitted.

XI. RELATED PROCEEDINGS APPENDIX

There are no related proceedings.